

What is claimed is:

Sub A-17 1. A nursing type of electric motor-operated wheelchair, characterized by being provided with: a bar handle extending upward from the rear parts of right and left side frames to form a gate shape in a double member structure made up of a fixed member attached to the rear parts of the right and left side frames and an external member disposed along at least upper side portion of the fixed member; a detecting means interposed between the fixed member and the external member to detect control information based on the external force applied to the external member; and a control means for controlling a driving motor to produce assisting power commensurate with the detected control information.

Sub A-17 2. A nursing type of electric motor-operated wheelchair according to claim 1, characterized in that the bar handle is formed in a double structure made up of a gate-shaped fixed member of a gate shape, attached to the rear parts of the right and left side frames and a movable member disposed for relative displacement along at least upper side portion of the fixed member, a displacement detecting means is disposed to detect control information, namely relative displacement between the fixed member and the movable member, and a control means is provided to control a driving motor to produce assisting power commensurate with the detected displacement.

3. A nursing type of electric motor-operated wheelchair according to claim 2, characterized in that the displacement detecting means is disposed in the center, with respect to the vehicle width, of at least one of the fixed member and the movable member, and guides are provided on right and left sides of the displacement detecting means to restrict up and down movements and to permit forward and reverse movements of the movable member.

Sub A-17 4. A nursing type of electric motor-operated wheelchair according to claim 2 or 3, characterized in that the displacement detecting means is disposed in the center, with

respect to the vehicle width, of at least one of the fixed member and the movable member, and grip members are provided on right and left sides of the movable member.

Sub A17 5. A nursing type of electric motor-operated wheelchair according to claim 4, characterized in that the right and left grip members attached to the movable member are positioned symmetrically apart from the longitudinal centerline of the vehicle and sloping obliquely up inward to the center in the vehicle width direction from right and left ends.

Sub A17 6. A nursing type of electric motor-operated wheelchair according to one of claims 2 to 5, characterized in that the assist power controlling means controls the driving motor to move forward according to the magnitude of the relative displacement between the fixed member and the movable member caused by pressing the upper side portion of the bar handle, and controls the driving motor to move backward when a separately provided first operator is turned on.

Sub A17 7. A nursing type of electric motor-operated wheelchair according to one of claims 2 to 5, characterized in that the assist power controlling means controls the driving motor to move forward or backward according to the magnitude of the relative displacement between the fixed member and the movable member of the bar handle, and controls the driving motor to stop irrespective of the value detected with the displacement detecting means when a separately provided second operator is turned on.

Sub A17 8. A nursing type of electric motor-operated wheelchair according to claim 6 or 7, characterized in that operators including a reverse switch, a power switch, and a speed regulation device, etc. and displays including a power display, a display for indicating the necessity of charging, an anomaly display, etc. are collectively disposed in the center, with respect to the vehicle width, of the external member of the bar handle.

Sub A17 9. A nursing type of electric motor-operated wheelchair

according to claim 1, characterized in that a load detecting means for detecting the magnitude of the load, as the control information, applied to the external member is disposed between the fixed member and the external member, and a control means is provided to control the driving motor so as to produce assist power commensurate with the detected load.

*Sub A 17* 10. A nursing type of electric motor-operated wheelchair according to claim 9, characterized in that a magnetostriction sensor for detecting the load and a magnetostriction sensor for compensating the output from the load-detecting magnetostriction sensor are provided.

*Sub A 17* 11. A nursing type of electric motor-operated wheelchair according to claim 10, characterized in that the load-detecting magnetostriction sensor and the output-compensating magnetostriction sensor are disposed to face each other and a damping member is interposed between the two sensors.

*Sub A 17* 12. A nursing type of electric motor-operated wheelchair according to claim 9 or 10, characterized in that a load transmitting member for transmitting load to the load-detecting magnetostriction sensor is attached to the external member in such a manner that its position relative to the load-detecting magnetostriction sensor may be adjusted.

*Sub A 17* 13. A nursing type of electric motor-operated wheelchair according to claim 12, characterized in that an adjusting means that lights up or goes out depending on the relative positions of the load transmitting member and the load-detecting magnetostriction sensor is provided.

*Sub A 17* 14. A nursing type of electric motor-operated wheelchair according to claim 1, characterized in that the detecting means outputs control information based on the external force acting on the external member in horizontal or slightly down forward direction.

*Sub A 17* 15. A nursing type of electric motor-operated wheelchair

according to claim 1, characterized in that the external member is provided with a handle cover disposed in the center of vehicle width, and right and left grip portions extending right and left from the handle cover, the top surface of the handle cover is formed to be an operation panel portion for placing various switches, on one side in the vehicle width direction of the handle cover's top surface is formed a rotary switch placing portion to be a step lower than the operation panel portion, a rotary switch is disposed rotatably in the rotary switch placing portion, and the rotary switch is provided with operation tongue portions projecting toward the grip member.

Sub A7 16. A nursing type of electric motor-operated wheelchair according to claim 1, characterized in that the external member is provided with a handle cover disposed in the vehicle width center, and right and left grip members extending right and left from the handle cover, the top surface of the handle cover is formed to be an operation panel portion for placing various switches, a push switch is disposed in a switch hole formed in the operation panel portion such that it projects upward from the top surface of the operation panel portion, and a switch circumferential wall is formed on the circumferential edge of the switch hole so as to surround the push switch and approximately flush with the top surface of the push switch.

Sub A7 17. A nursing type of electric motor-operated wheelchair provided with a push handle for nursing, attached to the body of the wheelchair propelled as driven with a motor, characterized by being provided with: a human force detecting means for detecting human force when the push handle is pushed forward; an operator for propelling the vehicle body backward; and a motor control means for driving the motor forward according to the detected value coming from the human force detecting means and for driving the motor backward when the operator is turned on.

*Sub 18* 18. A nursing type of electric motor-operated wheelchair provided with a push handle for nursing, attached to the body of the wheelchair propelled as driven with a motor, characterized by being provided with: a human force detecting means for detecting human force from relative movement amount when the push handle is pushed forward; a zero point detecting means for outputting a zero point signal when the relative movement amount of the push handle is a specified value; and a motor control means for controlling the motor using a reference value which is the value detected with the human force detecting means when the zero point signal is outputted.

*Sub 19* 19. A nursing type of electric motor-operated wheelchair according to claim 18, characterized in that the motor control means controls the motor according to a first and a second insensible zones, with the first insensible zone defined to be one in which the relative movement amount of the push handle is smaller than the above specified movement amount, and with the second insensible zone defined to be one ranging from the above specified movement amount to an upper limit of an insensible zone which is greater than the specified movement amount.

*Sub 20* 20. A nursing type of electric motor-operated wheelchair according to claim 19, characterized in that the motor control means drives the motor forward according to the value detected with the human force detecting means when the detected value is beyond the second insensible zone, makes the output of the motor zero when the detected value is in the second insensible zone, and causes the motor to function as a generator brake when the detected value is in the first insensible zone.

*Sub 21* 21. A nursing type of electric motor-operated wheelchair according to one of claims 17 to 20, characterized in that, the push handles are made up of right and left leg portions secured to the right and left frames of the vehicle body and extending upward and an operating section interconnecting the upper ends of the right and left leg portions, a movable member

capable of making back-and-forth relative movement is disposed in the operating section, the movable member is adapted to be capable of projecting and retracting back and forth through slits formed in the operating section, and the human force detecting means detects the human force as the movable member moves back and forth.

Sub 217 22. A nursing type of electric motor-operated wheelchair according to claim 21, characterized in that right and left movable members are disposed in the right and left grip members of the operating section, the right and left movable members are interconnected through a connecting member, and the human force detecting means detects the relative movement amount of the approximate central portion of the connecting member.

Sub 217 23. A nursing type of electric motor-operated wheelchair according to claim 17 or 18, characterized in that the push handles are made up of right and left leg portions secured to the right and left frames of the vehicle body and extending upward and grips attached to the top end portions of the respective leg portions, at least one of the right and left grips is made capable of making relative back-and-forth movement, and the human force detecting means detects the human force from the relative movement amount of the movable grip.

added 22 claims 24-26 >